Claims 1-20 are pending in the application. Claims 7 and 9 are amended above to correct indefiniteness problems. New claims 19-20 are added to the application. No new matter has been added to the application by way of these specification and claim amendments.

I.   TRAVERSE OF THE ANTICIPATION REJECTION

The examiner rejected claims 1-8 and 10-15 for being anticipated by Haskell (USPA 2006/192711)(hereinafter "Haskell 11"). Claims 1 is an independent apparatus claim and claim 10 is an independent method claim equivalent of claim 1. The applicant's positions with respect to the novelty of independent claim 1 apply equally to independent claim 10 and to claims dependent upon claims 1 and 10.

Regarding claims 1 and 10, the Examiner states that Haskell discloses a phased array antenna system with controllable electrical tilt including an antenna with multiple antenna elements having:

a) means for providing two basis signals with variable relative delay (v1 a, V1 b, *(sic, actually V2a, V2b)* article 46, FIG. 3). *(Applicant's italics)*

b) splitting means for dividing the basis signal *(sic: should be "signals")* into signal components (FIG. 3)

c) phase to power converting means (FIG. 3)

d) power to phase converting means (see FIG. 3).

The examiner's identification of the "basis signal" of element b) of claim 1 is incorrect. Instead claim 1c) reads "splitting apparatus for dividing the basis signals into signal components", i.e. the expression "basis signals" is plural in claim 1 but not in the examiner recitation of the element. This difference is important because it is one basis for demonstrating that the examiner's anticipation rejection is without merit.

Claims 1-8 and 10-15 are novel because Haskell 11 does not disclose the feature c) and d) of claim 1. In Applicant's invention claim 1 paragraph c) call for a splitting apparatus or for dividing the basis signals into signal components. This necessarily means that there are more signal components than basis signals. Moreover, claim 1 paragraph d) requires phase to power converting apparatus for converting the signal components into transformed components having powers which vary as the relative delay varies. Consequently, paragraphs c) and d) of claim 1

collectively require splitting apparatus to generate more signal components than there are basis signals for conversion into transformed components. Paragraph e) of claim 1 requires power to phase converting apparatus for converting the transformed components into antenna element drive signals. Claims 1-8 and 10-15 are novel at least because Haskell 11 does not disclose these aspects of the claims.

The examiner's application of Haskell 11 to the claimed invention is also faulty. Haskell 11 Fig. 3 discloses two signals V2a, V2b with variable relative delay - V2a is V1a after variable delay at 46 and V2b is V1b after fixed delay at 48. V1a and V1b are simply split at 44 from a single signal. They are therefore in phase with one another - variable relative delay is absent. Consequently, contrary to the Examiner's statement at a) at the foot of page 2, V1a and V1b cannot correspond to the claimed two basis signals. Instead the two basis signals actually correspond to V2a, V2b which are variably delayed relative to one another. Moreover, in Haskell 11, the two basis signals V2a, V2b are input directly to a phase to power converter 50 as the converter's only two inputs. The two basis signals V2a, V2b are not divided into signal components to provide input to the phase to power converter 50 as claimed. Consequently, paragraph c) of claim 1 is not disclosed in Haskell 11.

Claims 1-8 and 10-15 are independently novel and patentable because paragraph d) of claim 1 is not disclosed in Haskell 11. Claim 1, paragraph d) calls for "phase to power converting apparatus for converting the signal components into transformed components having powers which vary as the relative delay varies". In Haskell 11 a phase to power converter 50 converts basis signals V2a, V2b, and not signal components divided from basis signals as is claimed.

Claims 1-8 and 10-15 are further independently novel and patentable because Haskell 11 does not disclose the claim 1 part (e) feature of a "power to phase converting apparatus for converting the transformed components into antenna element drive signals . . .". Instead, Haskell 11's power to phase converting apparatus 56_1 to 56_n converts transformed basis signals V3a, V3b into antenna element drive signals. Haskell 11 does not convert transformed signal components divided from basis signals into antenna element drive signals as is claimed.

Based upon the positions presented above, it is clear that Haskell 11 fails to disclose at least three different features of Applicant's claim 1. As noted above, independent claim 10 is a method claim equivalent of claim 1 and similar novelty positions apply to the claim. Claims 2-8

depend from independent claim 1 and claims 11-15 depend from independent claim 10, and these dependent claims are consequently not anticipated by Haskell 11 at least by virtue of their dependencies.

Claims 2 and 11 are independently novel and patentable over Haskell 11. Regarding claims 2 and 11, the Examiner states that "Haskell *(i.e. Haskell 11)* discloses the phase to power converting means is a plurality of hybrid radio frequency coupling devices ("hybrids") arranged to provide sums and differences of pairs of signal components, each pair having signal components from both basis signals". The examiner is incorrect because as has been shown above, Haskell 11 does not disclose division of basis signals into signal components. Instead Haskell 11's phase to power converting means converts the basis signals themselves – not components of them. Claims 3-6 and 12-15 are also independently patentable by virtue of their dependence upon claims 2 and 11.

II.   TRAVERSE OF THE OBVIOUSNESS REJECTION

The Examiner rejected claims 7-9 and 16-18 under 35 U.S.C. 103(a) over Haskell 11 as applied to claims 1 and 10 above, and further in view of published USPA No. 2006/0208944 to Haskell (hereinafter "Haskell 44").

As an initial matter, claims 7-9 and 16-18 are patentable by virtue of their dependence upon either claims 1 or 10 which are patentable for at least the reasons recited in Section I above.

In issuing the obviousness rejection, the Examiner acknowledges that Haskell 11 does not disclose the first splitting being three way (claim 7, 16), or the second splitting being two way splitters (claims 8, 17) and relies upon Haskell 44 Fig. 7 for teaching three way and two way splitters. However, Haskell 44 Fig. 7 shows first (or basis signal) splitters 124_1 and 124_2 which are three way, but one respective signal component a1$\mathbf{A}$, b1$\mathbf{B}$ from each of these splitters goes not to phase to power converting apparatus 134_1 or 134_2, but instead to fixed delays or ϕ phase shifts 128_1 and 128_2 respectively. This is contrary to paragraph d) of claims 1 and 10 from which claims 7 and 16 respectively depend indirectly. Consequently claims 7 and 16 are non-obvious and patentable because the examiner has not made out a *prima facie* case of obviousness.

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Claim 8 depends from claim 6 which adds a second splitting apparatus for dividing the sums and differences into components for input to the second hybrids, and claim 8 relates to splitting being two way. Haskell 44 shows two two-way and two three-way splitters 124_3 to 124_6 which provide input to hybrids 134_3 to 134_6. However, these splitters also provide input to four fixed delays or ϕ phase shifts 128_3 to 128_6, and in fact each two-way splitter 124_3 or 124_4 only provides input to one respective hybrid 134_5 or 134_6, not a plurality of hybrids as claimed. Claim 8 is non-obvious for this reason as is claim 17.

One important point about claims 7, 8, 16 and 17 lies in the fact that Applicant's invention can be accomplished with splitters which divide into relatively few signals. The problems of splitters are discussed in Applicant's specification at page 4 line 24 to page 5 line 10. In brief, one problem lies in high splitter ratios resulting in microstrip track failure. Other potential problems are: a) too many splitter outputs for a single splitter; b) widely varying splitter ratios reduce frequency range; and c) multiple splitters result in different feeder lengths to antenna elements. All of these problems make it desirable to reduce the number of splitters and the splitter ratios. Applicant's invention is therefore advantageous because it can be realised with only two-way and three-way splitters.

Regarding claims 9 and 18, the examiner acknowledges that Haskell 11 does not disclose same numbers of components extending from basis signal to antenna elements. The Examiner goes on to state that "Haskell 44 teaches … 12 components (splitters plus hybrid combiners) correspond to 12 elements", and that "It would have been obvious to use … same number of components in order to achieve the purpose of driving 12/corresponding antenna elements". It appears that the Examiner has misread claims 9 and 18. The focus of these claims is on the discovered advantage when all paths to contain the same numbers and types of components because anything (e.g. temperature change) affecting one path affects all paths equally because they are equivalent. Anything affecting all paths to antenna elements equally does not change antenna tilt. This advantage does not apply to paths containing different numbers and/or types of components. Haskell 44 does <u>not</u> disclose paths containing the same numbers and types of components. Ignoring common items, i.e. splitters 124_1 and 124_2 and preset phase shifts 136_1 etc., Fig 7 shows signals passing via (a) two hybrids, (b) one hybrid, one two-way splitter and another hybrid, (c) one hybrid, one two-way splitter and one fixed delay ϕ, (d) one fixed delay ϕ, one three-way splitter and another fixed delay ϕ, (e) one fixed delay ϕ, one three-way splitter,

and one hybrid. Consequently, Haskell 44 discloses not one but five different kinds of paths as regards numbers and types of components, and therefore does not anticipate claims 9 and 18.

III. NEW CLAIMS 19-20

To emphasise the difference between Haskell 11 and Applicant's invention, Applicant submits new claims 19 and 20 which have a more detailed treatment of the division of the basis signals into signal components.

CONCLUSION

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